

Density Lab: Salty, Sugary, or Plain?

Background Information

Density is the amount of mass in a given volume. It can be calculated using the formula: $\text{Density } (\rho) = \text{Mass} \div \text{Volume}$. When substances like salt or sugar are dissolved in water, the mass increases while the volume stays nearly the same, resulting in a higher density. If liquids of different densities are carefully layered, they will stack with the densest on the bottom and the least dense on top. This lab helps us explore how solutes affect density and how we can observe it in a fun and visual way.

Objective

- Investigate how adding salt or sugar affects the density of water.
- Observe how density influences liquid layering and buoyancy.

Develop a Hypothesis

Which solution will be the most dense? Which will be the least dense? *Write your hypothesis as a complete sentence.*

If . . . _____
_____,
then . . . _____
_____.

Materials

- 3 small, empty jars
- 1 graduated cylinder
- 1 teaspoon
- 3 pipettes
- Red food coloring
- Blue food coloring
- Green food coloring
- 3 raisins or grapes
- Table salt
- Granulated sugar
- Water

Procedures

1. Fill each jar three quarters full with water.
2. Add 2 teaspoons of salt to a jar and stir until dissolved. Add 1-2 drops of **red** food coloring and stir.
3. Add 2 teaspoons of sugar to the second jar and stir until dissolved. Add 1-2 drops of **blue** food coloring and stir.
4. Add 1-2 drops of **green** food coloring to the last jar and stir.
5. Gently place a raisin or grape in each container. Record whether it sinks or floats. Remove with a spoon.
6. Use a clean pipette or pour the salt water (red) into the graduated cylinder until it is about one quarter full.
7. Using a clean pipette, slowly add the sugar water (blue) one drop at a time to the graduated cylinder. Continue until the graduated cylinder is half full.
8. Using a clean pipette, slowly add the plain water (green) one drop at a time to the graduated cylinder. Continue until the graduated cylinder is three quarters full.

TIP: For best results, add each layer very slowly and avoid disturbing the surface. If added too quickly, the layers will mix, and the colors will blend.

Results

Data Table:

Solution	Solute Added	Color	Raisin: Sink or Float?	Notes on Solution Appearance
Jar 1	Salt (2 tsp)	Red		
Jar 2	Sugar (2 tsp)	Blue		
Jar 3	None	Green		

Conclusion

Was your hypothesis supported? Why or why not? *Write your response in complete sentences.*

Analysis Questions

Write your responses in complete sentences.

1. Which liquid was densest?
2. Why did the raisin float where it did?
3. What happened when you tried to layer the liquids?
4. How does dissolving salt or sugar in water affect its density?
5. Where do you see density layering in real life?

Adapted from:

<https://teaching.betterlesson.com/lesson/637199/liquid-density-lab-salty-or-sweet>